



Laramie Energy, LLC

Garfield County, CO

CC 604-41-32 Pad

CC 0697-03-09W

Wellbore #1

Design: Wellbore #1

QES Survey Report

17 August, 2019





Survey Report



Company:	Laramie Energy, LLC	Local Co-ordinate Reference:	Well CC 0697-03-09W
Project:	Garfield County, CO	TVD Reference:	Well @ 8639.0usft (RKB 30')
Site:	CC 604-41-32 Pad	MD Reference:	Well @ 8639.0usft (RKB 30')
Well:	CC 0697-03-09W	North Reference:	True
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	EDM 5000.1 Single User Db

Project	Garfield County, CO		
Map System:	US State Plane 1983	System Datum:	Mean Sea Level
Geo Datum:	North American Datum 1983		
Map Zone:	Colorado Central Zone		

Site		CC 604-41-32 Pad						
Site Position:		Northing:	1,639,464.67	usft	Latitude:	39.557630		
From:	Lat/Long	Easting:	2,233,548.14	usft	Longitude:	-108.218770		
Position Uncertainty:	0.0	usft	Slot Radius:	13-3/16	"	Grid Convergence:	-1.71	°

Well	CC 0697-03-09W					
Well Position	+N/-S	0.0 usft	Northing:	1,639,411.88 usft	Latitude:	39.557484
	+E/-W	0.0 usft	Easting:	2,233,539.71 usft	Longitude:	-108.218794
Position Uncertainty		0.0 usft	Wellhead Elevation:	usft	Ground Level:	8,609.0 usft

Wellbore	Wellbore #1				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	HDGM	8/13/2019	9.55	65.78	51,412.50000000

Design	Wellbore #1				
Audit Notes:					
Version:	1.0	Phase:	ACTUAL	Tie On Depth:	0.0
Vertical Section:	Depth From (TVD) (usft)	+N/-S (usft)	+E/-W (usft)	Direction (°)	
	0.0	0.0	0.0	79.03	

Survey Program	Date	8/17/2019			
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
294.0	9,962.0	QES MWD Surveys (Wellbore #1)	MWD	OWSG MWD - Standard	

Survey									
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
0.0	0.00	0.00	0.0	0.0	0.0	0.0	0.00	0.00	0.00
First MWD Survey @ 294.0'MD / 293.6' TVD									
294.0	5.30	105.60	293.6	-3.7	13.1	12.2	1.80	1.80	0.00
386.0	7.20	92.10	385.0	-5.0	22.9	21.6	2.60	2.07	-14.67
477.0	9.10	76.60	475.1	-3.5	35.6	34.3	3.17	2.09	-17.03
569.0	11.30	73.50	565.7	0.7	51.4	50.6	2.46	2.39	-3.37
660.0	12.50	74.40	654.7	5.9	69.4	69.3	1.33	1.32	0.99
752.0	13.80	79.70	744.3	10.5	89.8	90.1	1.93	1.41	5.76
843.0	15.40	76.20	832.4	15.3	112.2	113.1	2.01	1.76	-3.85
935.0	17.20	74.60	920.7	21.9	137.2	138.8	2.02	1.96	-1.74
1,027.0	18.90	77.80	1,008.1	28.6	164.9	167.3	2.14	1.85	3.48



Survey Report



Company:	Laramie Energy, LLC	Local Co-ordinate Reference:	Well CC 0697-03-09W
Project:	Garfield County, CO	TVD Reference:	Well @ 8639.0usft (RKB 30')
Site:	CC 604-41-32 Pad	MD Reference:	Well @ 8639.0usft (RKB 30')
Well:	CC 0697-03-09W	North Reference:	True
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	EDM 5000.1 Single User Db

Survey									
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
1,121.0	21.00	77.40	1,096.5	35.5	196.2	199.4	2.24	2.23	-0.43
1,216.0	23.40	77.20	1,184.4	43.4	231.2	235.2	2.53	2.53	-0.21
1,311.0	24.10	79.40	1,271.4	51.2	268.7	273.5	1.19	0.74	2.32
1,405.0	27.30	81.10	1,356.1	58.0	308.8	314.2	3.49	3.40	1.81
1,500.0	26.50	81.50	1,440.8	64.5	351.3	357.2	0.86	-0.84	0.42
1,594.0	27.80	80.40	1,524.4	71.3	393.7	400.0	1.48	1.38	-1.17
1,689.0	27.70	79.70	1,608.5	78.9	437.2	444.3	0.36	-0.11	-0.74
1,784.0	26.50	78.70	1,693.1	87.0	479.7	487.5	1.35	-1.26	-1.05
1,879.0	27.70	77.20	1,777.7	96.1	522.1	530.8	1.45	1.26	-1.58
1,973.0	27.60	78.30	1,860.9	105.3	564.7	574.4	0.55	-0.11	1.17
2,068.0	27.40	78.50	1,945.2	114.2	607.7	618.3	0.23	-0.21	0.21
2,162.0	26.30	76.40	2,029.1	123.4	649.1	660.7	1.55	-1.17	-2.23
2,257.0	25.30	72.50	2,114.6	134.4	688.9	701.9	2.07	-1.05	-4.11
2,352.0	23.70	73.20	2,201.0	146.0	726.6	741.1	1.71	-1.68	0.74
2,446.0	22.00	77.90	2,287.7	155.2	761.9	777.5	2.65	-1.81	5.00
2,534.0	20.80	78.30	2,369.6	161.8	793.3	809.6	1.37	-1.36	0.45
2,669.0	18.40	74.30	2,496.8	172.4	837.3	854.8	2.04	-1.78	-2.96
2,763.0	17.30	76.70	2,586.2	179.7	865.2	883.5	1.41	-1.17	2.55
2,858.0	17.20	77.70	2,677.0	185.9	892.6	911.7	0.33	-0.11	1.05
2,953.0	18.90	79.60	2,767.3	191.7	921.5	941.1	1.89	1.79	2.00
3,047.0	18.30	79.40	2,856.4	197.2	951.0	971.1	0.64	-0.64	-0.21
3,142.0	18.20	78.80	2,946.6	202.8	980.2	1,000.9	0.22	-0.11	-0.63
3,237.0	18.10	78.90	3,036.9	208.5	1,009.2	1,030.5	0.11	-0.11	0.11
3,331.0	16.70	77.30	3,126.6	214.3	1,036.7	1,058.6	1.57	-1.49	-1.70
3,426.0	16.30	80.30	3,217.7	219.5	1,063.2	1,085.5	0.99	-0.42	3.16
3,521.0	16.00	80.60	3,308.9	223.9	1,089.2	1,111.9	0.33	-0.32	0.32
3,611.0	17.40	80.80	3,395.1	228.1	1,114.8	1,137.8	1.56	1.56	0.22
3,710.0	16.60	79.40	3,489.8	233.1	1,143.3	1,166.7	0.91	-0.81	-1.41
3,805.0	17.80	81.40	3,580.5	237.7	1,171.0	1,194.8	1.41	1.26	2.11
3,900.0	16.90	80.60	3,671.2	242.2	1,199.0	1,223.1	0.98	-0.95	-0.84
3,994.0	17.20	80.10	3,761.1	246.8	1,226.1	1,250.7	0.36	0.32	-0.53
4,089.0	16.80	79.50	3,851.9	251.7	1,253.5	1,278.5	0.46	-0.42	-0.63
4,184.0	16.90	77.50	3,942.9	257.2	1,280.4	1,306.0	0.62	0.11	-2.11
4,278.0	18.10	77.40	4,032.5	263.3	1,308.0	1,334.2	1.28	1.28	-0.11
4,373.0	16.60	75.90	4,123.2	269.8	1,335.6	1,362.5	1.65	-1.58	-1.58
4,467.0	17.60	75.70	4,213.0	276.6	1,362.4	1,390.1	1.07	1.06	-0.21
4,562.0	17.80	77.60	4,303.5	283.3	1,390.5	1,419.0	0.64	0.21	2.00
4,657.0	17.90	81.20	4,394.0	288.6	1,419.1	1,448.1	1.17	0.11	3.79
4,751.0	16.90	79.50	4,483.6	293.3	1,446.8	1,476.2	1.19	-1.06	-1.81
4,846.0	17.90	81.10	4,574.3	298.1	1,474.8	1,504.6	1.17	1.05	1.68
4,940.0	16.80	80.00	4,664.0	302.7	1,502.5	1,532.6	1.22	-1.17	-1.17
5,035.0	17.30	81.60	4,754.8	307.2	1,530.0	1,560.5	0.72	0.53	1.68
5,130.0	17.40	82.90	4,845.5	311.0	1,558.0	1,588.7	0.42	0.11	1.37



Survey Report



Company:	Laramie Energy, LLC	Local Co-ordinate Reference:	Well CC 0697-03-09W
Project:	Garfield County, CO	TVD Reference:	Well @ 8639.0usft (RKB 30')
Site:	CC 604-41-32 Pad	MD Reference:	Well @ 8639.0usft (RKB 30')
Well:	CC 0697-03-09W	North Reference:	True
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	EDM 5000.1 Single User Db

Survey										
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)	
5,224.0	15.50	81.70	4,935.7	314.5	1,584.4	1,615.3	2.05	-2.02	-1.28	
5,319.0	17.20	81.20	5,026.8	318.5	1,610.8	1,642.0	1.80	1.79	-0.53	
5,414.0	18.50	76.40	5,117.3	324.2	1,639.4	1,671.1	2.07	1.37	-5.05	
5,508.0	16.70	76.30	5,206.9	330.9	1,667.0	1,699.5	1.92	-1.91	-0.11	
5,603.0	14.50	77.90	5,298.4	336.6	1,691.9	1,725.0	2.36	-2.32	1.68	
5,698.0	14.10	80.30	5,390.4	341.1	1,714.9	1,748.5	0.75	-0.42	2.53	
5,793.0	15.60	79.50	5,482.2	345.4	1,738.9	1,772.8	1.59	1.58	-0.84	
5,887.0	17.70	77.20	5,572.3	350.8	1,765.3	1,799.8	2.34	2.23	-2.45	
5,982.0	17.20	77.00	5,662.9	357.2	1,793.0	1,828.2	0.53	-0.53	-0.21	
6,077.0	17.30	78.10	5,753.6	363.3	1,820.5	1,856.4	0.36	0.11	1.16	
6,171.0	18.60	78.00	5,843.1	369.3	1,848.9	1,885.4	1.38	1.38	-0.11	
6,266.0	17.50	78.90	5,933.4	375.2	1,877.7	1,914.8	1.19	-1.16	0.95	
6,361.0	18.70	76.70	6,023.7	381.4	1,906.6	1,944.3	1.45	1.26	-2.32	
6,455.0	17.60	76.00	6,113.0	388.3	1,935.0	1,973.5	1.19	-1.17	-0.74	
6,550.0	19.40	78.30	6,203.1	395.0	1,964.4	2,003.7	2.04	1.89	2.42	
6,645.0	17.80	78.40	6,293.1	401.1	1,994.1	2,034.0	1.68	-1.68	0.11	
6,739.0	18.00	79.00	6,382.6	406.8	2,022.4	2,062.9	0.29	0.21	0.64	
6,834.0	18.00	78.70	6,472.9	412.5	2,051.2	2,092.2	0.10	0.00	-0.32	
6,929.0	17.70	80.40	6,563.4	417.7	2,079.8	2,121.3	0.63	-0.32	1.79	
7,023.0	16.40	81.30	6,653.2	422.1	2,107.1	2,148.9	1.41	-1.38	0.96	
7,118.0	15.30	81.60	6,744.6	426.0	2,132.7	2,174.8	1.16	-1.16	0.32	
7,213.0	13.70	82.00	6,836.6	429.4	2,156.2	2,198.6	1.69	-1.68	0.42	
7,307.0	11.90	81.70	6,928.2	432.3	2,176.9	2,219.4	1.92	-1.91	-0.32	
7,402.0	11.80	77.10	7,021.2	435.9	2,196.0	2,238.8	1.00	-0.11	-4.84	
7,497.0	10.50	74.70	7,114.4	440.4	2,213.8	2,257.2	1.45	-1.37	-2.53	
7,592.0	9.20	73.90	7,208.0	444.8	2,229.5	2,273.4	1.38	-1.37	-0.84	
7,687.0	7.50	77.90	7,302.0	448.2	2,242.8	2,287.1	1.89	-1.79	4.21	
7,781.0	7.30	72.20	7,395.2	451.3	2,254.5	2,299.2	0.81	-0.21	-6.06	
7,876.0	7.30	60.80	7,489.5	456.1	2,265.6	2,310.9	1.52	0.00	-12.00	
7,970.0	6.70	59.00	7,582.8	461.8	2,275.5	2,321.8	0.68	-0.64	-1.91	
8,065.0	4.80	57.60	7,677.3	466.8	2,283.6	2,330.7	2.01	-2.00	-1.47	
8,160.0	3.20	53.40	7,772.1	470.5	2,289.1	2,336.8	1.71	-1.68	-4.42	
8,255.0	1.80	51.80	7,867.0	473.0	2,292.4	2,340.5	1.48	-1.47	-1.68	
8,349.0	0.80	51.90	7,960.9	474.3	2,294.0	2,342.4	1.06	-1.06	0.11	
8,443.0	0.30	322.70	8,054.9	474.9	2,294.4	2,342.9	0.90	-0.53	-94.89	
8,537.0	1.10	252.20	8,148.9	474.8	2,293.4	2,341.8	1.11	0.85	-75.00	
8,630.0	2.00	253.60	8,241.9	474.1	2,291.0	2,339.3	0.97	0.97	1.51	
8,724.0	2.40	246.80	8,335.8	472.9	2,287.6	2,335.8	0.51	0.43	-7.23	
8,818.0	2.90	236.70	8,429.7	470.8	2,283.8	2,331.7	0.73	0.53	-10.74	
8,912.0	3.40	230.00	8,523.6	467.7	2,279.7	2,327.0	0.66	0.53	-7.13	
9,007.0	4.20	230.70	8,618.4	463.7	2,274.8	2,321.5	0.84	0.84	0.74	
9,101.0	3.50	226.40	8,712.2	459.5	2,270.1	2,316.1	0.81	-0.74	-4.57	
9,196.0	3.60	229.70	8,807.0	455.6	2,265.7	2,311.0	0.24	0.11	3.47	



Survey Report



Company:	Laramie Energy, LLC	Local Co-ordinate Reference:	Well CC 0697-03-09W
Project:	Garfield County, CO	TVD Reference:	Well @ 8639.0usft (RKB 30')
Site:	CC 604-41-32 Pad	MD Reference:	Well @ 8639.0usft (RKB 30')
Well:	CC 0697-03-09W	North Reference:	True
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	EDM 5000.1 Single User Db

Survey										
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)	
9,291.0	4.00	234.80	8,901.8	451.8	2,260.7	2,305.4	0.55	0.42	5.37	
9,385.0	4.00	240.20	8,995.5	448.2	2,255.2	2,299.3	0.40	0.00	5.74	
9,480.0	4.50	241.30	9,090.3	444.8	2,249.1	2,292.6	0.53	0.53	1.16	
9,574.0	4.50	242.70	9,184.0	441.3	2,242.6	2,285.6	0.12	0.00	1.49	
9,764.0	4.50	251.40	9,373.4	435.5	2,228.9	2,271.0	0.36	0.00	4.58	
9,858.0	4.10	255.20	9,467.1	433.5	2,222.1	2,264.0	0.52	-0.43	4.04	
9,902.0	4.10	253.20	9,511.0	432.6	2,219.1	2,260.9	0.32	0.00	-4.55	
TD @ 9962.0' MD / 9570.9' TVD										
9,962.0	4.10	253.20	9,570.9	431.4	2,215.0	2,256.6	0.00	0.00	0.00	

Design Annotations					
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates			
		+N/-S (usft)	+E/-W (usft)	Comment	
294.0	293.6	-3.7	13.1	First MWD Survey @ 294.0'MD / 293.6' TVD	
9,962.0	9,570.9	431.4	2,215.0	TD @ 9962.0' MD / 9570.9' TVD	

Checked By: _____	Approved By: _____	Date: _____
-------------------	--------------------	-------------